

**ILLINOIS COMMERCE COMMISSION**

**DOCKET NO. 16-0093**

**IAWC EXHIBIT 3.00R**

**REBUTTAL TESTIMONY OF  
JEFFREY T. KAISER**

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**ILLINOIS-AMERICAN WATER COMPANY**

**JUNE 15, 2016**

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6    **I.     WITNESS IDENTIFICATION AND BACKGROUND**

7    **Q.     Please state your name and business address.**

8    **A.     My name is Jeffrey T. Kaiser. My business address is 100 North Water Works**  
9    **Drive, Belleville, Illinois 62223.**

10 **Q.     Are you the same Jeffrey T. Kaiser who previously testified in this**  
11 **proceeding?**

12 **A.     Yes, I am.**

13 **II.    PURPOSE OF REBUTTAL TESTIMONY**

14 **Q.     What is the purpose of your rebuttal testimony?**

15 **A.     I explain how the Company's aging infrastructure will drive the need for**  
16 **significant increases in capital investment in the coming decades. IAWC witness Bruce**  
17 **Hauk (IAWC Ex. 1.00R) explains why it is important for the Commission to authorize an**  
18 **ROE sufficient to attract the capital necessary to meet these investment requirements.**  
19 **IAWC witness Paul R. Maul (IAWC Ex. 10.000R) explains how these investment**  
20 **requirements will drive growth in the water and sewer industries at a rate that exceeds**  
21 **growth in the overall economy.**

**III. INFRASTRUCTURE REPLACEMENT**

**Q. Why is it necessary to replace aging infrastructure?**

A. Like any man-made equipment, water treatment and distribution plant items such as treatment basins and equipment, pump stations, hydrants, distribution system mains and valves, etc. are subject to age, wear and tear, and have a finite life span. Pipes will eventually corrode and leak, valves corrode and break or leak when used, pumps become less efficient and require more power and servicing, and the treatment facilities deteriorate due to age and in some cases severe service conditions. In many ways, maintaining a water treatment and distribution system or a wastewater collection and treatment system is like maintaining a car: it requires proper use and preventive maintenance to maximize the useful lives of the components, but the older they get, the more they cost to maintain. At some point, the facilities are either no longer capable of reliably performing their intended purpose, or replacement is actually less costly to IAWC's customers than continual repairs.

**Q. How much has the Company spent to replace water and sewer infrastructure since the last rate case?**

A. In the period since the test year in the last case (2013) through the test year in this proceeding (2017), the Company will have invested more than \$400 million to replace or improve its infrastructure, which averages to approximately \$100 million per year. This work has included the replacement of water main and associated valves and hydrants, water meters, sewer mains, major pumping station and treatment plant improvements including electrical and pumping system improvements, chemical storage and feed system improvements, etc.

45 **Q. Looking to the future, do you expect the level of investment in**  
46 **infrastructure replacement to generally follow historical trends?**

47 **A.** Absolutely not. While treatment plant investments will likely remain somewhat  
48 constant, the buried infrastructure such as mains and valves, continues to age at a  
49 more rapid rate than it is currently being replaced. This buried infrastructure will require  
50 a more aggressive effort to keep pace with the growing amount of infrastructure  
51 reaching the end of its useful life, and a corresponding increase in the amount of  
52 replacement spending.

53 **Q. What should the Commission know about the age of the Company's**  
54 **system?**

55 **A.** A substantial portion of the Company's water and sewer infrastructure is  
56 approaching the end of its useful life. Across the state, approximately 14% (610 miles)  
57 of existing IAWC water mains were installed in the 1920's or earlier and are now nearly  
58 100 years old and very close to, or have already exceeded their anticipated service life.  
59 In addition to these 100 year old mains, engineers began specifying the use of  
60 galvanized steel water mains in the 1950 and 1960's, however this material has  
61 experienced a shorter-than-expected service life and, therefore, higher-than-expected  
62 rate of failure. All told, IAWC currently estimates that more than 825 miles of main has  
63 reached the end of its useful service life and is in need of replacement in the near future  
64 to maintain current service levels.

65 **Q. How long will it take to complete the replacement of these mains?**

66 **A.** At IAWC's recent average replacement rate of 0.5 percent (21 miles) per year, it  
67 will take more than 39 years, or until the year 2055 to complete this work while during  
68 this same time an additional 20 percent (860 miles) of main will have reached the end of  
69 its expected service life. By 2050, IAWC estimates more than one third of the  
70 infrastructure that exists today (1400 miles of main) will have reached the end of its  
71 anticipated service life. Keeping pace with the need to replace this aging infrastructure  
72 will dictate a substantial increase in future capital investment.

73 **Q. Is the Company able to predict when any given component of its**  
74 **infrastructure will need to be replaced?**

75 **A.** Not really. The concept of a "useful life" has an economic meaning that does not  
76 necessarily match up with the actual length of time an asset remains in service. For  
77 example, for purposes of calculating depreciation expense, water mains are assumed to  
78 have a useful life of up to 55 years. Based on our experience, however, we know that  
79 thick walled cast iron pipes will typically remain in service for 100 years or more, while  
80 other materials, such as galvanized steel and early versions of ductile iron, are lucky to  
81 last 50 years. The challenge for the Company is predicting how long its assets will  
82 remain operationally viable before requiring replacement. The vintage and material of  
83 pipe are important factors in understanding the potential need to replace, but to my  
84 knowledge the science in this field has not advanced to a level where it is possible to  
85 know *exactly* what infrastructure might fail, when, and under what circumstances.

86 **Q. Given the inability to know exactly how long an asset will last, is there any**  
87 **way to model or forecast future capital needs for the replacement of aging**  
88 **infrastructure?**

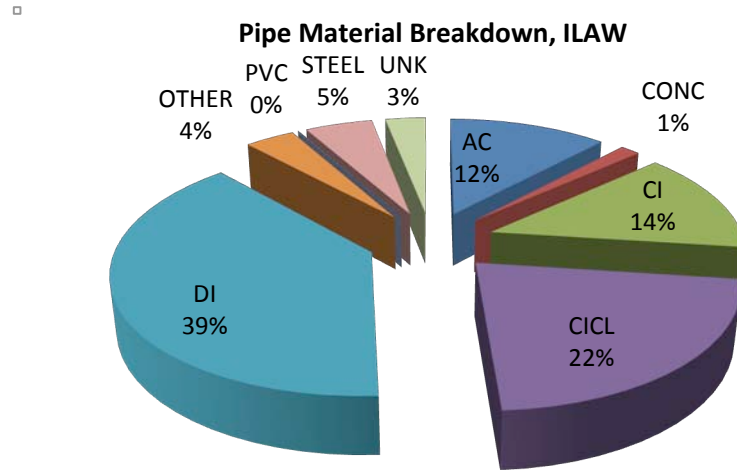
89 **A.** There are several methods for forecasting future capital requirements, but one of  
90 the most common, and the approach followed by the Company, is to calculate what is  
91 known as a “Nessie Curve” for the Company’s distribution system. This is the same  
92 methodology used in two prominent AWWA studies that brought national attention to  
93 the challenges posed by aging water and sewer infrastructure: “Dawn of the  
94 Replacement Era” (2001) and “Buried No Longer: Confronting America’s Water  
95 Infrastructure Challenge” (2013).

96 **Q. What is a Nessie Curve?**

97 **A.** A “Nessie Curve” is the graphical output of an infrastructure assessment model  
98 used to forecast the failure rate of utility assets based on a number of factors, including  
99 the age of the asset, operating pressures, pipe material, and pipe size. For example,  
100 utilizing information from the IAWC Geographical information System (GIS), the  
101 Company can see of what materials the water distribution system is constructed as  
102 shown in Figure 1.0, and when the infrastructure was installed as shown in Figure 2.0.

103

**Figure 1.0 Pipe Material**



104

DI – Ductile Iron	CICL – Cast Iron Concrete Lined
CONC - Concrete	CI – Cast Iron (unlined)
AC – Asbestos Cement (Transite)	UNK – Unknown
STEEL – Steel (Galvanized Steel)	PVC – PolyVinyl Chloride
Other – High Density Polyethelene, Copper, Cured in Place Pipe,	

105

**Figure 2.0 Pipe Age**

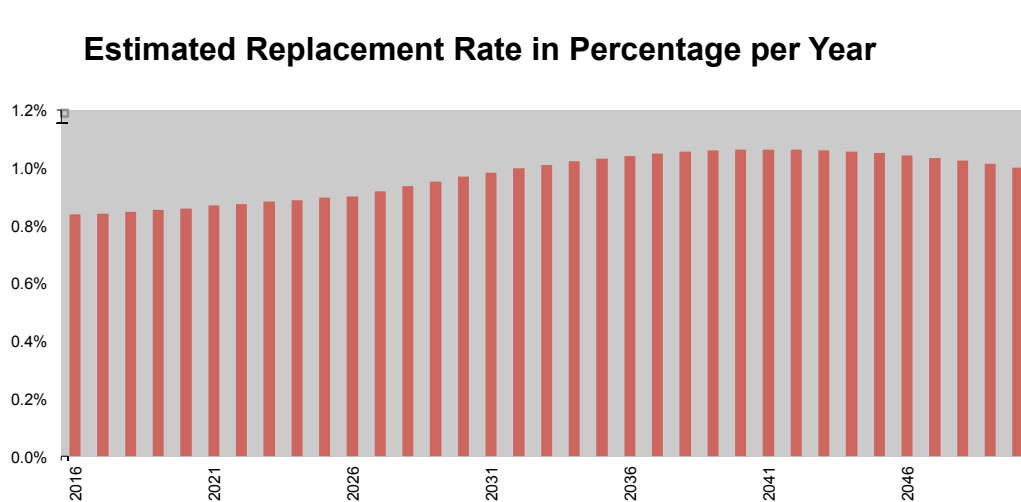
Decade	Miles of main in-service
Pre-1890	194.8
1890-1900	23.7
1900-1910	57.8
1910-1920	154.6
1920-1930	183.0
1930-1940	137.1
1940-1950	132.4
1950-1960	593.7
1960-1970	724.1
1970-1980	480.4
1980-1990	346.5
1990-2000	691.4
2000-2010	464.0
2010-2016	114.4



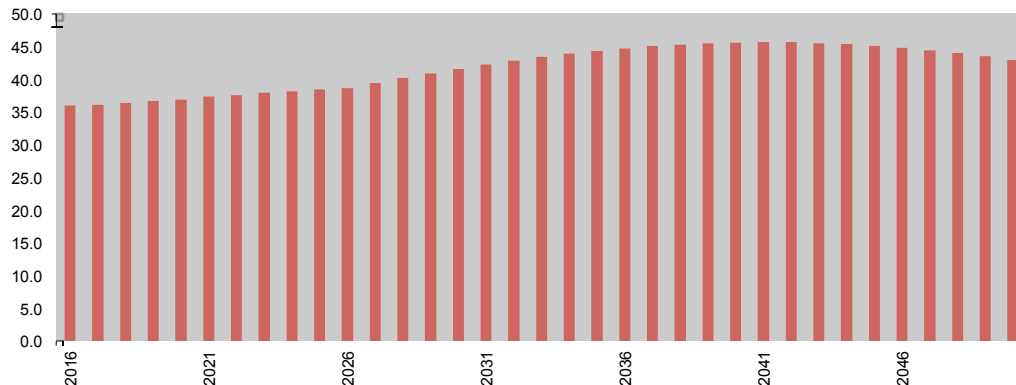
**Q. How does the information presented in Figures 1 and 2 factor into the Nessie Curve?**

**A.** Characteristics including pipe or equipment material, year of installation, operating conditions and similar factors are incorporated into the Nessie model to compute the recommended timeframe for replacement. When the output of the model is plotted on a graph, the resulting incline in future investment needs is said to resemble the silhouette of the Loch Ness monster. The Nessie Curve for IAWC's water distribution system is shown in Figure 3.0:

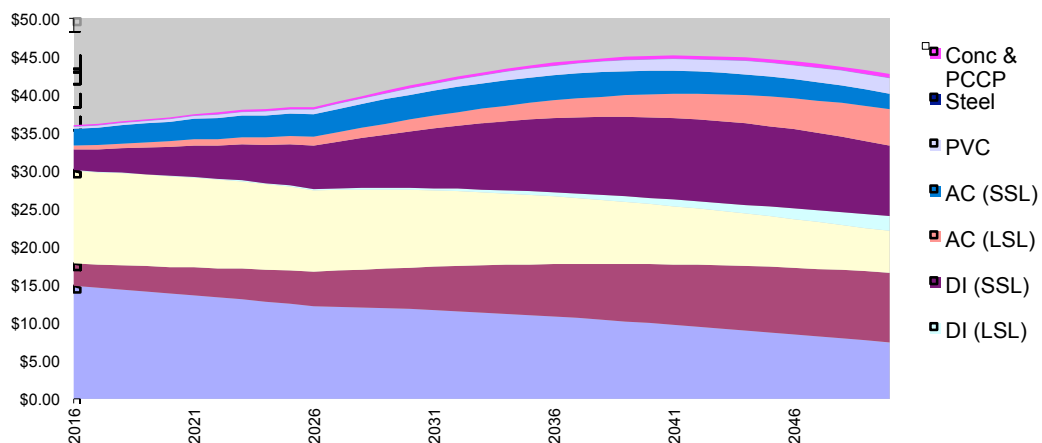
**Figure 3.0 Nessie Recommended Replacement Rate**



**Estimated Replacement Rate in Miles per Year**



**Estimated Replacement Expenditure by Pipe Material**



**Q. What does the Nessie Curve for IAWC's system tell us about future investment needs for infrastructure replacement?**

**A.** The curve indicates that based upon IAWC's current mix of pipe materials and pipe age, the Company should currently be replacing mains at a rate of roughly 0.84 percent (36 miles) per year, and that this rate of replacement should grow to a peak replacement rate of roughly 1.06 percent (45 miles) per year by the year 2039.

125 **Q. What is the Company's current rate of main replacement?**

126 **A.** The rate of replacement has varied from year to year, but over the past five years  
127 the average rate of replacement has been approximately 0.5 percent.

128 **Q. Will the Company need to increase the rate of replacement?**

129 **A.** Yes. To address the needs indicated by the Nessie analysis, this average rate of  
130 replacement will need to increase by roughly 30 percent. At an average main  
131 replacement cost of roughly \$1 million per mile, this increased replacement rate will  
132 require a corresponding increase in main replacement spending of more than \$15  
133 million per year in the near term and more than \$23 million per year by 2039 (2016  
134 dollars).

135 **Q. Is the Company unique, or do other water utilities also face increasing**  
136 **capital needs for infrastructure replacement?**

137 **A.** The Company is not at all unique. The need to replace aging water and sewer  
138 infrastructure is a national issue. The 2013 AWWA study, for example, concludes that  
139 over the next 25 years, it will cost water utilities in the United States at least \$1 trillion to  
140 maintain current levels of service. By 2050, the investment need reaches \$1.7 trillion.

141 **Q. You have discussed the need for investment in the future, but why should**  
142 **anyone care about this now?**

143 **A.** The money it will take to replace obsolete infrastructure represents a very real  
144 future liability. It is more economical in the long term to proactively address  
145 infrastructure replacement than to "kick the can" down the road to future generations.  
146 We know for a fact that our water and wastewater infrastructure is wearing out and a

considerable portion of it is already or will shortly be in need of replacement. The easy course of action would be to rely on a costly, haphazard approach of replacing infrastructure only after it is beyond further repair. The belief that deferring capital expenditures for replacement as long as possible will “save” money for current ratepayers ignores that this “savings” does not acknowledge that costs will also go up without a replacement plan. Current ratepayers who falsely believe they are “saving” money will be spending more in the short term due to the increased O&M expense and lower levels of service associated with older infrastructure and they will still have to pay for the infrastructure replacement when the failure rate exceeds tolerable levels. Regardless of how utilities and regulators ultimately respond to the looming challenge of aging infrastructure, there can be no debate that this challenge is real. Whether the necessary investment is made now or made later, the investment will need to be made. As Mr. Maul and Mr. Hauk explain, it is critical to adequately compensate those willing to fund this investment.

**Q. Is the Company asking the Commission to make any findings about the need for, or cost of, the future replacement of aging infrastructure?**

**A.** The Company is not asking the Commission to make any specific findings in this regard. Nor does the Company believe that its discussion of aging infrastructure will be particularly controversial or surprising. Certainly there will be differing views on how to best deal with the cost to replace aging infrastructure. The point I wish to impress upon the Commission is that aging infrastructure presents a significant and growing challenge, and meeting this challenge will require capital investment at levels far above historical averages.

**IV. DEMAND STUDY**

**Q. Does the AG agree that the Company should stop collecting individual customer data for demand studies submitted with future rate filings?**

**A.** Yes. AG witness Scott J. Rubin agrees that it is not cost effective to continue collecting individual customer data for demand study purposes.

**Q. What is Staff's recommendation concerning future demand studies?**

**A.** Staff witness Christopher L. Boggs recommends that the Commission limit the demand study requirement to once every 10 years and that each time IAWC files a rate case before expiration of the demand study in 2026, IAWC provide evidence that there has not been significant and continual change in the overall system maximum day to average day ratio.

**Q. Do you agree with Mr. Boggs's recommendation that a direct measurement study should be completed every ten years?**

**A.** No. While I agree that an updated demand study may be beneficial in future rate proceedings, the use of a direct measurement demand study methodology is expensive and not likely to provide the results necessary to update the demand factors. To re-implement the direct measurement demand study would first require a review of customer usages to determine which customers in each district fall into the usage categories necessary to provide a representative sample. This costly effort combined with the cost to then collect the data multiple times through the year, and analyze the data make this a very expensive effort. In addition, if the year selected for the direct measurement demand study is not a dry weather year with significant peak usage, it is likely that the data collected would not represent the usage patterns needed for the

193 development of a accurate demand factors. A much better way to produce updated  
194 demand factors would be to follow the AWWA recommended methodology, which  
195 utilizes historic data to develop demand factors, as discussed by IAWC witness Paul R.  
196 Herbert (IAWC Ex. 11.00R). This AWWA methodology is the industry standard, would  
197 be much less expensive than a direct measurement demand study, and would  
198 incorporate data from multiple years allowing IAWC to capture the peak usage periods  
199 necessary to develop accurate demand factors. Therefore, I would recommend that  
200 IAWC perform a demand study in the time frame suggested by Mr. Boggs, but that the  
201 AWWA methodology be used.

202 **V. CONCLUSION**

203 **Q. Does this conclude your rebuttal testimony?**

204 **A.** Yes, it does.